

Results and critical analysis of the application of the CRASH neurotrauma outcome calculator within the patient cohort 2010-2014 of the Ghent University Hospital

Matthias Dullaert¹, Joyce Oerlemans¹, Giorgio Hallaert², Peter De Paepe³, Jean-Pierre Kalala Okito²
²Dept of Neurosurgery, Ghent University Hospital; ³Dept of Emergency Medicine, Ghent University Hospital;
¹Ghent University, Ghent, Belgium

Background & Aim

- Traumatic Brain Injury (TBI) = significant cause of morbidity and mortality among young people
- CRASH calculator predicts mortality and unfavourable outcome after TBI at 14 days (dead) and after 6 months (Glasgow Outcome Scale <4)
- Prognostic variables used in calculator: age, sex, cause of trauma, Glasgow Coma Scale, pupil reactivity, CT-scan findings, polytrauma, high/low income country
- Aim: validate the CRASH calculator by applying to neurotrauma patient cohort 2010-2014 of Ghent University Hospital

Material & Methods

- Retrospective cross-sectional observational study

TBI patients Jan 2010 – Dec 2014
n=959

Patients ≥ 15 years old
n=571

No known history of TBI, no missing data
n=417

- Calculating CRASH score and looking up real life outcome was done separately by the 2 researchers

N=417

Researcher 1

Researcher 2

Step 1: calculating CRASH score

n=209

Step 1: calculating CRASH score

n=208

Step 2: looking up real life outcome in patient files
n=208

Step 2: looking up real life outcome in patient files
n=209

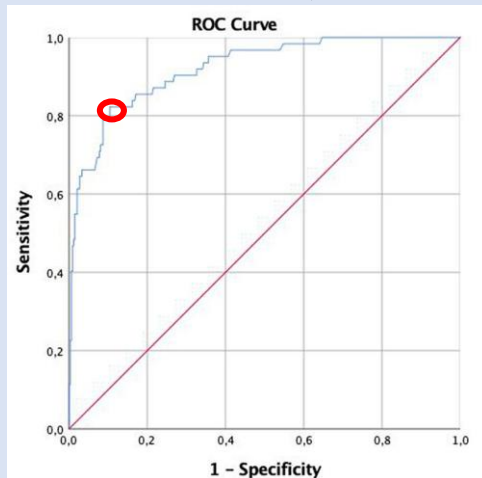
- Statistical validation of CRASH calculator using ROC-curve analysis

Conclusion & Take Home Messages

- ❑ There is currently no consensus about the validity of the CRASH calculator and similar prognostic tools
- ❑ This study shows that the calculator can be used in clinical practice
- ❑ However, this calculator can **NOT** replace clinical decision-making process of physicians
- ❑ Further research is strongly recommended

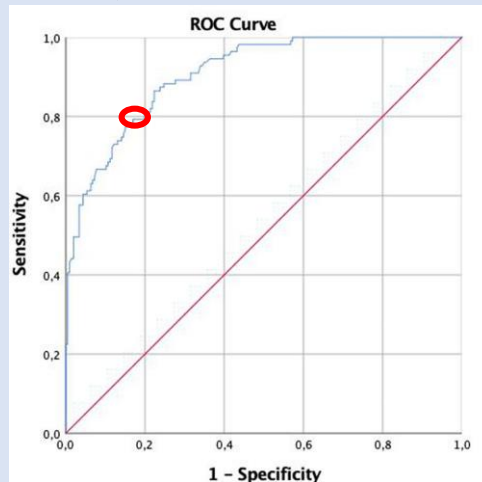
Results

- 14 days after trauma
mean CRASH score: 18,8%
patients alive: 80,1%
Area Under Curve (AUC): 92,1%



Cut-off value: 31,5% (sens 0,823; spec 0,895)
NPV 96,5%; PPV 59,3%; RR 16,7

- 6 months after trauma
mean CRASH score: 41,5%
patients with GOS <4: 35%
AUC: 90,7%



Cut-off value: 55,75% (sens 0,793; spec 0,830)
NPV 88,1%; PPV 71,5%, RR 6

Discussion

- No cut-off value had a combined sensitivity and specificity of 100%
- Currently no consensus in literature about validity of CRASH calculator
- Limitations: retrospective study, subjective interpretation of GOS, observer variability in interpreting CT-scans
- Strengths: inclusion criteria very similar to original CRASH study, data collection performed blindly, heterogenous and large study population